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Effects of the Integration of Mexico into NAFTA on Trade, Industry, Employment and Economic Growth

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Abstract:

We present a comparison of economic development in Mexico with some OECD countries (France, Spain and the USA) and Latin American countries (Brazil and Argentina) and we analyse the evolution of employment in Mexico, having into account the positive impact that industrial development has in non-agrarian employment and the effects of the integration into NAFTA on trade and industrial development. We present an econometric model to explain non agrarian employment depending on direct and indirect effects of industrial development, and relate these findings with other studies on the effects of integration. Although the impact of integration was in many aspects positive, it is clear that it is not enough to foster industrial investment at the level necessary to achieve high rates of non agrarian employment and development in many Mexican regions. On the other hand, the problem of the negative evolution of agrarian employment of Mexico during the last years of the 20th century was more due to the consequences of the evolution of international relative prices of Agriculture than to the direct effects of the integration into NAFTA, and it was common to other countries. The main conclusions point to recommend industrial investment, to focus on regional and rural development, to increase the number of non-agrarian jobs, not only in urban areas but also in rural ones, in order to avoid compulsory emigration, and to eradicate poverty. These complementary policies would amplify the positive impact of integration and they should include a reinforcement of the recent effort to increase public expenditure on education per inhabitant in order to foster the positive effects of education on development.

JEL: C5, C51, J2, O51, O54

Key Words: Employment in Mexico, Industrial Growth in Mexico, Econometric Models of Non-Agrarian Employment, NAFTA.

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1.- Introduction.

After some years of hope in the effects of economic integration into NAFTA the results of the first period after the integration, 1994-2002, show several positive impacts on the Mexican economy, although economic policies in Mexico should also address other questions to solve problems that need some complementary economic policies, because economic integration is a help but not the only factor to have into account for improving economic development.

Economists are aware that economic miracles exist, such were the famous cases of Japan, Ireland, Singapore, Spain, and many other countries, during the 20th century, but those miracles need some help both from governments and citizens. Improving economic integration is only a part of the measures that a government should adopt to improve increases in real Gdp per inhabitant and in socio-economic welfare. We make here some references to some of those important complementary measures and their relevance in order to improve economic development in Mexico and to increase the rates of employment in this important American country.

In sections 2 we present a comparative analysis of Mexico with other OECD and Latin American countries regarding the evolution of real Gross Domestic Product, Gdp, Population and real Gdp per inhabitant, Gdph, during the last decades of the 20th century, in which we can see a good performance of real Gdp of Mexico, in comparison with other countries, although it has not be so high to guarantee a high rate of increase in Gdp during a period of high rates of population growth.

In section 3 we relate industrial development, human capital and foreign trade and we analyse several socio-economic problems of Mexico, such as demographic growth and regional disparities, in order to suggest some economic policies that could improve economic development. There, we also present a survey of the literature on integration into NAFTA.

In section 4 we analyse the evolution of Employment by sector of Mexico according to several statistical sources, and analyse the evolution of this variable in Agriculture, Industry, Building and Services in comparison with the USA, Spain and European Union countries, and we present an econometric model of non-agrarian employment in Mexico, which has into account the important positive impact of industrial growth on the level of employment of non-agrarian sectors.

Finally in section 5 we present the main conclusions with special emphasis on economic policy suggestions to improve industrial development in Mexico and its positive impact on non-agrarian employment.

2.- Economic Growth and Development of Mexico and International Comparisons, 1960-2000.

We analyse economic growth by means of the evolution of real Gross Domestic Product, Gdp, and economic development both in strict economic sense, by means of the evolution of real Gdp per inhabitant, and in a wider sense having into account some important socio-economic questions related with development and well-being such as regional development, educational expenditure and poverty indicators.

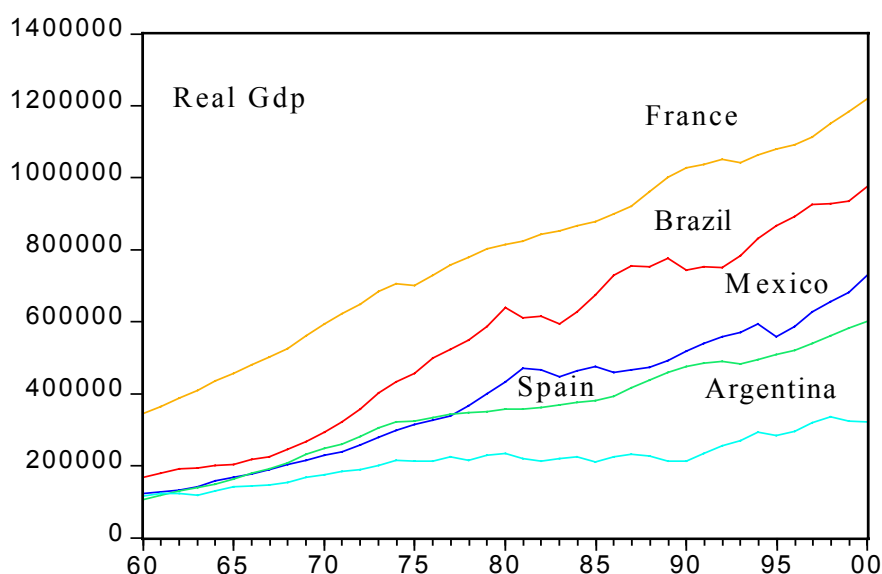
Mexico, as well as Brazil and other Latin American countries, have experienced very high rates of growth of real GDP but very small rates of growth of real GDP per inhabitant, as a consequence of very high fertility rates and population growth.

The low educational level of population in many geographical areas is the main cause of excessive fertility and low levels of production per inhabitant in comparison with more industrialized countries. At the end of the 20th century the educational level of these countries have experienced a positive evolution although it is still far below the level of more developed countries.

International comparison of real Gdp per inhabitant

Graph 1 presents the evolution of real Gross Domestic Product, Gdp, of Mexico in comparison with some American and European countries, during the period 1960-2000, while graph 2 presents the evolution of Population and graph 3 real Gdp per inhabitant, Gdph, according to data published by Maddison(2001), OECD, ECLAC and other international statistical sources.

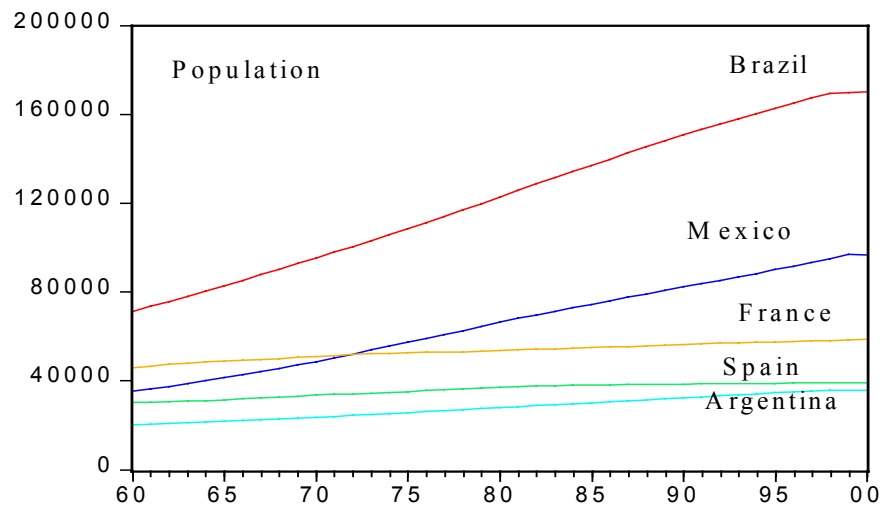
Graph 1. Evolution of real Gdp in Mexico and other countries
(millions US dollars at 1990 prices and PPPs)



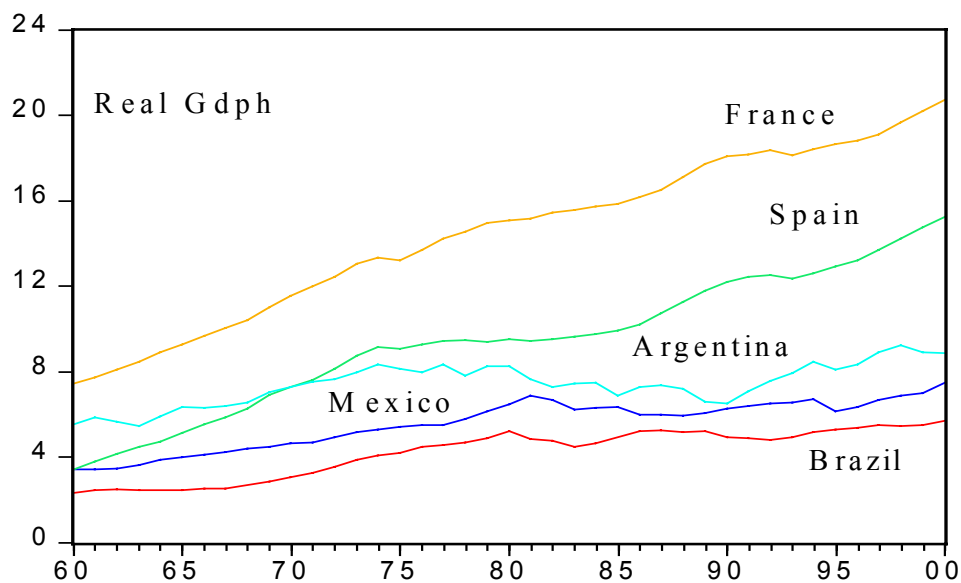
In graph 1 we can notice that economic growth in Mexico has been important since 1960, with a higher increase than those of Spain and Argentina, although below the evolution of Brazil and France.

On the other hand, graph 2 shows that the increase of Population in Mexico has been very important, and although the country still has a moderate density of population by square kilometre, that increase has been too fast in comparison with the evolution of production, and that explains a moderate rate of increase in Gross Domestic Product per inhabitant.

Graph 2. Evolution of Population in Mexico and other countries
(thousands of inhabitants)



Graph 3. Evolution of real Gdp per inhabitant in Mexico and other countries
(thousand US dollars at 1990PPPs)



We can notice that, in spite of very important increases in real Gdp, Mexico and other Latin American countries, such as Brazil, have had lower increases in real Gdp per inhabitant than European countries, such as France and Spain, what has been due to the important increases of population in Latin American countries during the second half of the 20th century.

Graph 4 shows the percentages of Population growth during the period 1960-2000, where we see that the moderate growth of population in France and Spain, with less than 40% increase in forty years, the very high growth of Mexico, with more than 160%, and Brazil,

with nearly 140%. and an intermediate position, between the highest and the lowest, for Argentina with nearly 80%.

Population increases when there are important immigration movements or high fertility rates. In the case of Latin American countries, during the second half of the 20th century, the latter has been the most usual situation.

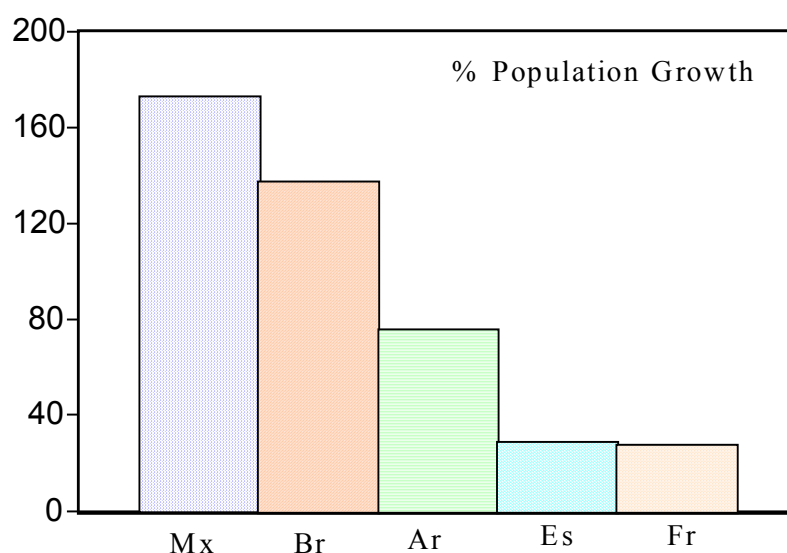
According to econometric modelling of international comparisons of fertility rates, as that of Guisan, Aguayo and Exposito(2001) with a world wide sample of 98 countries, average fertility is negatively related with the educational level of population, so generally the higher the educational level the lower the average fertility rate, until stabilization of average fertility rates around 1.5 or 2 in countries with highly educated population.

Latin American countries have experienced average fertility rates generally between 2.5 and 7.5 children per woman during the second half of the 20th century, with values between 2.3 and 5.4 in 1995, according to the statistical data from Barro and Lee(2001). In the case of Mexico the fertility rate evolved from 6.7 in 1960 to 3.2 in 1995.

The diminution of excessively averages values of fertility rates has had generally a positive impact on economic development at world level.

In the case of Argentina, some authors as Robbins(1999) have found some contradictory results in the relation between educational level of population and economic development, because Argentina shows high values of average years school of population and low levels of educational expenditure per inhabitant. This particular situation of Argentina is analysed by means of an econometric model by Guisan and Martinez(2003).

Graph 4. Population growth in Mexico and other countries
(% of total increase in the period 1960-2000)



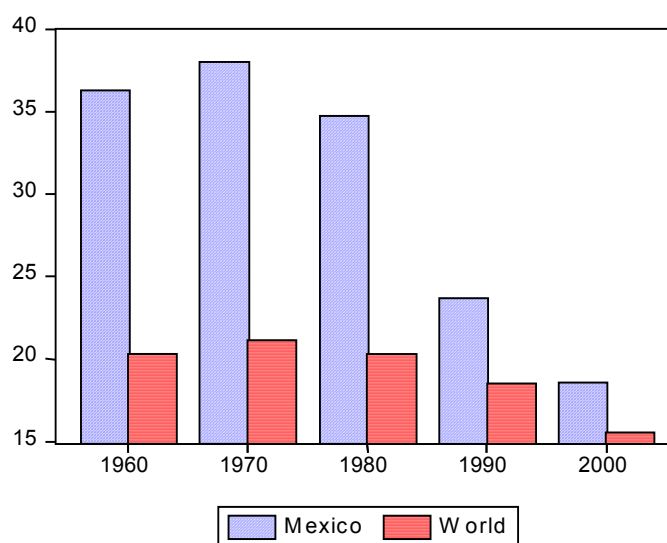
Each country has generally a percentage of population growth according to the value of its fertility rate, which is negatively correlated with the educational level of population. The case of Brazil is exceptional because it is one of the few countries in the world that have

lowered fertility rates below the value corresponding to its level in general education thanks to special educational policies with that purpose.

Fortunately, the growth rate of population in Mexico has lowered down and that favours the possibilities to increase real Gdp per inhabitant, although at the end of the 20th century, with an average value of 1.81% per year during the period 1990-99, it was higher than the corresponding world average of 1.48%, and much higher than the average rate of the USA, which was 0.99% per year during that period. It is important to remark that the improvement of education could lower down fertility rates and favour the demographic convergence to more moderate rates of growth of population, similar to the USA and other industrialized countries.

Graph 5 shows that the percentage of population growth in Mexico have lowered down during the last decades of the 20th century, as well as its difference with world average. This demographic change has been due mainly to the reduction on average fertility rates as a consequence of higher educational level of population and also to the increase of immigration from Mexico to the USA.

Graph 5. Population growth of Mexico and world average
(percentages per decade during 1960-2000)



In next section, we analyse some important policies related with education expenditure, regional development and the evolution of agrarian and non-agrarian employment, which are of great importance for Mexico during the first decades of the 21st century. Fortunately there is an increasing number of Mexican economists and other researchers very conscious of the positive impact of this type of policies to improve economic development.

It is interesting to insist upon these main questions in order to achieve a general consensus on the priority of those policies and to improve international cooperation from the USA, Canada, the European Union and other developed countries to increase real Gdp per inhabitant in Mexico during the next years.

Besides, it is important to improve the cooperation of Mexico and the other two NAFTA countries, and from other OECD countries, regarding the development of Central American countries, because the low levels of economic development of several countries of that area will have indeed consequences on poverty and emigration, to Mexico and the other NAFTA countries, if there is not an important international aid to improve their economic development.

3.- Economic policies of Education, Regional Development and Rural Employment

Education and Population

The main challenge of Mexican economy is to increase the average years of schooling of population, as this ratio is very low in comparison with the USA, Canada and other industrialized countries. Fortunately the second report of President Ford shows a positive increase of the percentage of Gdp devoted to education expenditure, and it is very important to maintain and increase that expenditure, in order to achieve a high degree of real convergence of income per inhabitant with the USA and other advanced countries.

According to the data by Barro and Lee(2001) the average number of years of schooling of adult population in Mexico evolved from 6.37 in 1995 and 6.73 in 1999, while the figures corresponding to the USA in both years were 12.18 and 12.25. Mexico is not for the moment very near the USA and Canada regarding human capital, although the country is evolving slowly towards higher levels.

Besides, the level of public expenditure on education per inhabitant of Mexico, about 500 dollars per year, at 1999 prices and Purchasing Power Parities, during the last years of the 20th century, is less than one third of the value of this variable in the USA. The differences are even greater if we make the comparison in dollars at exchange rates. Although this value is comparatively high according to Latin American standards it should be not only maintained but even increased in order to face the important challenges of Mexican economic development.

Increasing average schooling attendance and education expenditure are the first steps to reduce high fertility rates and to increase, investment per inhabitant, productivity per worker and real production per inhabitant as it has been shown in Guisan, Aguayo and Exposito(2001) and other studies.

There are other important positive effects of education on economic development, such as those analysed in the studies cited in Neira and Guisan(2002), but generally the most important positive effect of education on the increase of real Gdp per inhabitant has been the demographic effects, through the diminution of excessively high average fertility rates, as it has happened in Japan, Ireland, and many other countries during the second half of the 20th century.

Regional Development

The efforts for evolving to higher levels of education varied among regions. Some regions have received more investments and expenditures on education than others and this main fact explains a great deal of the socio-economic differences by region.

According to Aregional(2002) there are important differences among Mexican regions in levels of welfare:

The highest levels of welfare correspond to the following regions: Aguascalientes, Baja California, Baja California Sur, Coahuila, Chihuahua, Mexico, Nuevo Leon, Sonora and Tamaulipas, all of them reaching level 6.

The regions with middle levels, between 3 and 5, are the following: Colima with level 4, Durango with 4, Guanajuato with 3, Jalisco with 4, Michoacan with 3, Morelos with 4, Nayarit with 4, Queretaro with 4, Quintana Roo with 5, Sinaloa with 4, Tlaxcala with 4, Yucatan with 4 and Zacatecas with 3.

The poorest regions, with levels below 1 and 2, are the following: Campeche with level 2, Chiapas with 1, Guerrero with 1, Hidalgo with 2, Oaxaca with 1, Puebla with 2, San Luis Potosi with 2, Tabasco with 2, and Veracruz with 2.

These authors analyse an important number of socio-economic indexes of great interest to follow the evolution of socio-economic disparities in Mexico.

On the other hand, Alvarez and Aguayo(2003) present an interesting econometric study of regional development in Mexico, having into account the positive impact of the public sector activities at regional level.

Agrarian Activities and Rural Employment

Rural poverty has a lot to do with evolution of real production and income in agrarian and non-agrarian activities at rural level. Rural population in Mexico amounts about 35 million people, according to the interesting study by Zorrilla(2002). The problems of unemployment, poverty and emigration of an important part of this population is not mainly due, in our opinion, to the integration into NAFTA, but it is a general problem that all OECD countries have experienced during the 20th century, as it can be seen in Guisan and Exposito(2002) and other studies.

According to some reports, such as the above mentioned historical study of agrarian demands and the evolution of agrarian policies by Zorrilla, and other interesting studies of Agriculture in Mexico, there is a high degree of concern about the future of income and employment in this sector. In this regard, we would like to insist on the real fact that the diminution of agrarian employment has been common to all industrialized countries during the second half of the 20th century and that those countries have solved the problem of unemployment, by increasing non-agrarian employment.

It is very important to improve economic policies to guarantee the increase of non-agrarian employments in all the rural areas affected by the problem of redundant workers from agrarian activities. So rural population could be maintained although some people would change to industry and services instead to work in Agriculture.

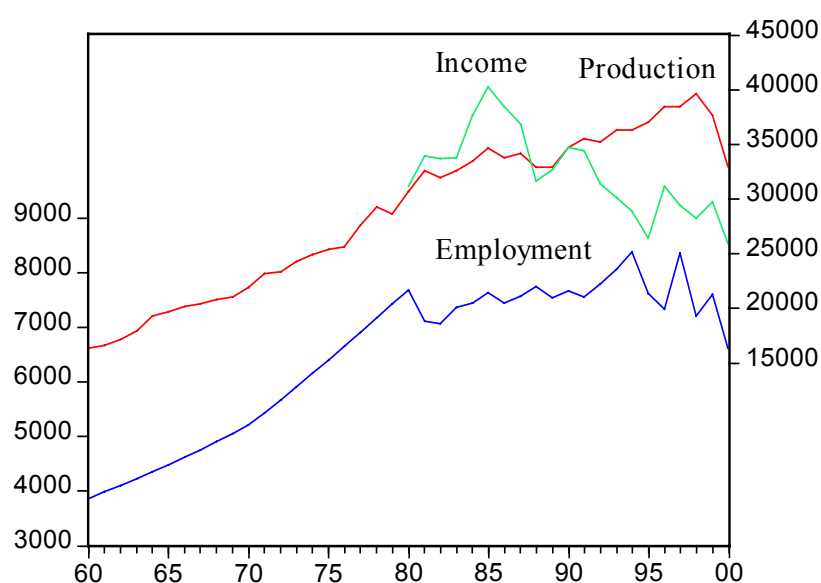
Those economic policies would avoid many social, human and economic problems derived from unwanted emigration from rural to urban areas. Other complementary policies

could also help to guarantee an increase in real wages and incomes from agrarian activities and to eradicate rural poverty, but generally the most important is the increase of non-agrarian jobs in many rural areas.

Graphs 6 and 7 show the evolution of employment and real Value-Added of Agrarian and Non-Agrarian sectors, according to the data by INEGI, OECD and some provisional estimations by Guisan(2003).

In the case of graph 6 we show the different evolution of real Value-Added of Agriculture according to the *income approach* and *production approach*. The first approach uses the general index of prices of private consumption and the second one the index of prices of agrarian value-added.

Graph 6. Employment and Real Value-Added of Mexico: Agrarian



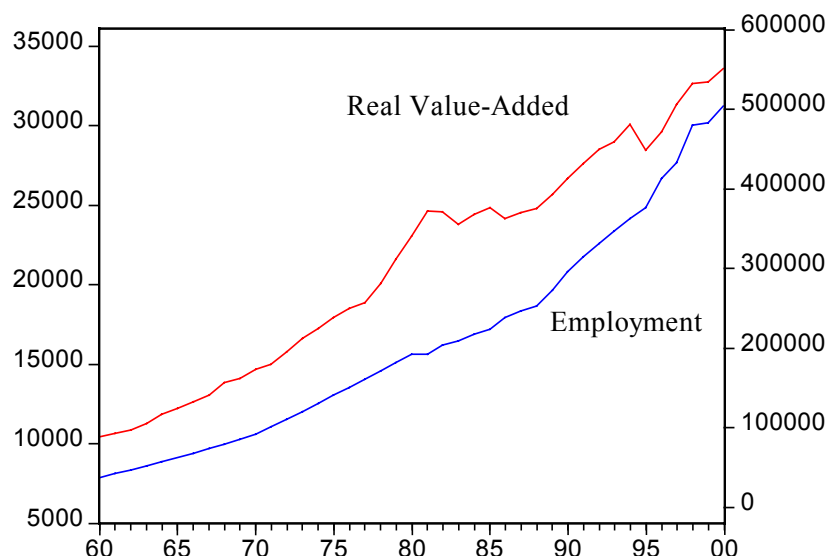
It is interesting to notice that in spite of an increase in production during the period 1985-98 there has been a decrease in real income as a consequence of the diminution of relative prices of Agriculture. It implies that a higher production level was needed in the period 1995-2000 to reach previous levels of real income.

That is not only a particular problem of Mexico, but also an international one, consequence of technological revolution in Agriculture. Guisan and Exposito(2002) have analysed this evolution for the case of four OECD countries: the USA, Japan, France and Spain.

Non-agrarian sectors generally have not such a different evolution of real Value-Added according to both approaches, although there are also some similarities with Agriculture in the case of some industrial sectors.

This means that in order to maintain real income in Agriculture and Industry is not enough to maintain the level of real production but it is usually necessary to increase it.

Graph 7. Employment and Real Value-Added of Mexico: Non-Agrarian



In graph 7, we can notice a positive evolution of real Value-added and Employment in non-agrarian activities since 1960, and particularly since 1988, with a positive evolution since 1995 showing a positive impact of integration into NAFTA.

In next section, we present a synthesis of several studies on the effects of economic integration of Mexico into NAFTA and the evolution of foreign trade and industrial growth, and, in section 5, we analyse the evolution of employment and present our econometric model of non-agrarian employment in Mexico.

4. Effects of the economic integration into NAFTA and evolution of Trade and Industry

A survey of the literature on integration into NAFTA show a general positive evaluation although in some cases lower than expected.

Hanson(2003) analyses the impact on wages and says that there is not evidence in favour of convergence of salaries between the countries of the area, in spite of migration movements, although he finds evidence in favour of higher wages in the areas where NAFTA has had more influence, specially in the border with the USA. This author also found evidence in favour of higher wages increases for qualified workers while less qualified workers have experienced some negative effects.

Wall(2002) analyses the effects of NAFTA on foreign trade and finds less trade among East Canada, the USA and Mexico, and more trade among Central Canada, the USA and Mexico.

Fukao, Okubo and Stern(2002) find that the diversification of trade is very clear in some sectors such as footwear and textiles but less clear in vehicles and television sets.

Chen and Martinez-Vazquez(2001) say that NAFTA has impacted deeply in the Mexican economy and its institutions, including the industrial distribution of taxes. They propose an adaptation of taxes more adequate for improving exports of goods and services.

Gruben(2001) declares that there are low relation between the increase of industrial maquila and NAFTA in Mexico. The econometric approach followed in that article suggests that fluctuations in the trade between the USA and Mexico are explained mainly by other factors although NAFTA has a part in the explanation.

Ianchovichina, Nicita and Soloaga(2001) analyse the effect of NAFTA in income distribution, by means of the Gini coefficient and other measures, and find increases of income in all the deciles of population.

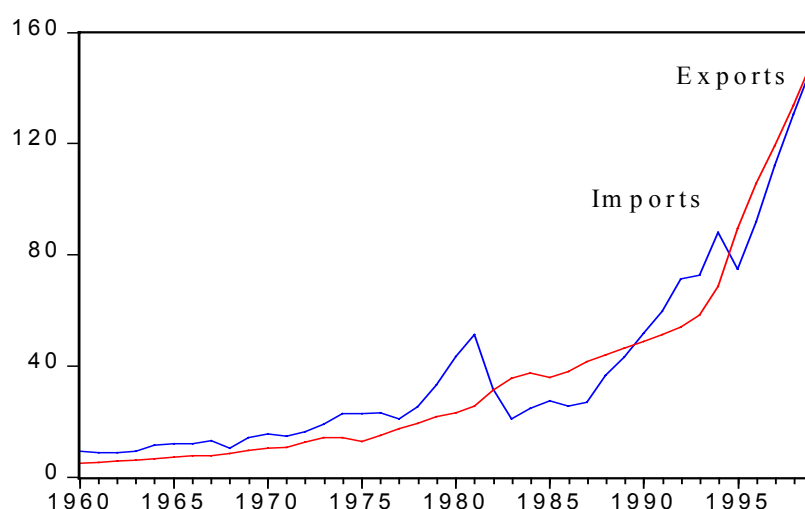
Dussel(2002) analyses the evolution of employment, productivity and foreign trade in Mexico since 1988 and found that in spite of some important increases of production, the results are below the expectations regarding economic development and employment. He compares the old policies of imports substitution with the new policies of foreign openness and found that the differences, although in favour of openness, are not so important as expected.

Evolution of foreign trade

Graph 8 shows the evolution of Imports and Exports of goods and services at 1990 prices and exchange rates of Mexico during the period 1960-99. The blue line corresponds to Imports and the red one to Exports.

A detailed analysis at current prices classified by types of goods is available at INEGI web site and there are several interesting studies related with the evolution of different types of goods and services.

Graph 8. Evolution of foreign trade in Mexico 1960-99
(Billions of dollars at 1990 prices and exchange rates)



Here we only present the general evolution of real Imports and Exports, in order to stand out two interesting features:

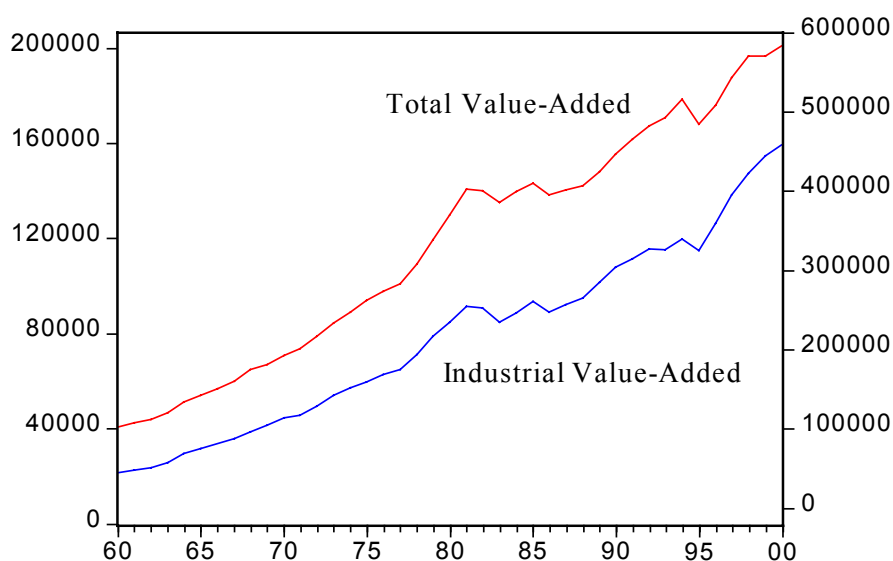
1) During the period 1975-81 the increase in Exports did not reach the same degree of expansion that Imports and that has implied the need to reduce imports with some negative consequences on industrial development.

2) Since 1994 the increase in real Exports has been very important, mainly due to the effect of economic integration into NAFTA, and that has had positive impact on the increase of Imports from 1995 onwards.

The increase of the degree of openness of Mexico to foreign trade has been generally positive to increase industrial production and the development of services and other non-agrarian services.

Graph 9 shows the evolution of real Value-Added in Industry and Total (the sum of real Value-Added of agrarian and non-agrarian activities), expressed in millions of US dollars at 1990 prices and Purchasing Power Parities, PPPs, where we can see a general positive trend for the period 1960-81, stagnation for 1981-1987 and a general positive trend since 1988, although with a temporary recession in 1995.

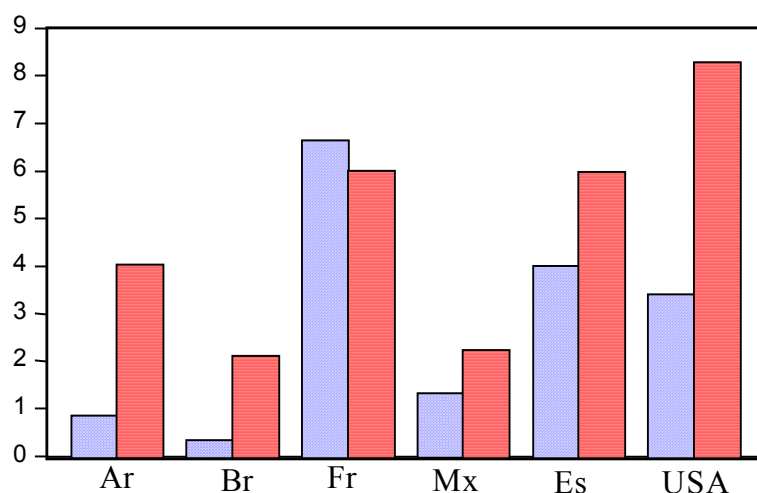
Graph 9. Evolution of Industry and Total Value-Added in Mexico
(millions of US dollars at 1990 prices and PPPs)



The positive evolution of foreign trade and industrial value-added have had a positive impact on the development of employment in services and other non-agrarian sectors, because there are important inter-sector relations that induce value-added of non agrarian sector.

Finally, graph 10 presents a comparison of exports per inhabitant and industrial Value-added per inhabitant of Mexico and other OECD (France, Spain and the USA) and Latin American (Argentina and Brazil) countries in 1999.

Graph 10. Exports per inhabitant and Industrial Value-Added in 1999
(thousand dollars at 1999 prices and PPPs)



Although generally a high level of industrial value-added per inhabitant implies a high level of foreign trade in per capita terms, both of imports and exports, there are other factors, such as the size of the country economy, which explain differences among countries, as it has been analysed in Guisan(2002) for the case of OECD countries and in other studies.

We can see that Brazil and Mexico have to multiply by a factor of 3 their industrial value-added per inhabitant in order to achieve a high degree of convergence with the USA and other highly industrialized countries.

In next section, we analyse the evolution of employment by sector in Mexico, according to several statistics and we present a comparison with the USA, Spain and the European Union, and our econometric model for non-agrarian employment of Mexico.

5.- Employment by sector in Mexico: comparison with OECD countries and econometric model of non-agrarian employment.

The evolution of employment in OECD countries during the last decades of the 20th century shows a trend to diminution of agrarian employment, stagnation of employment in industry and increases of employment in building and services.

In the first stages of industrialization agrarian employment usually represent an important percentage of total employment but in most advanced stages the share of agrarian employment usually diminish while employment in non agrarian sectors, specially in services, increases.

According to UN(2000), OECD(1999) and (2003), INEGI and other statistical sources, the real Value-Added of Manufacturing has experienced an important increase in Mexico since the integration into NAFTA with a change from 69985 millions of dollars at 1995 prices in year 1993 to a value of 90548 millions of dollars at 1995 prices in 1999, what implies a percentage change of almost 30% in 6 years, while the increase in the decade 1980-90 was of 27% in 10 years.

Real Gdp of Mexico has increased yearly by 2.1% during the period 1979-89 and 3.6% during the period 1989-2000, with rates of 5.2 in 1996, 6.8% in 1997, 5.0% in 1998, 3.8% in 1999 and 6.9% in 2000. Some of this rates remember the good years of the period 1970-73 when the average growth rate reached a 7%.

The positive evolution of manufacturing has had, on the other hand, an important positive impact in the development of other sectors, such as Building and Services, as we can see in the following tables, according to econometric models of inter-sector relationships as those presented in Guisan, Aguayo and Exposito(2001), and other studies.

Table 1 presents the data from INEGI classified by us according to 17 sectors classification of Eurostat, the European Union Statistical Office, while tables 2 and 3 present the results at highest levels of aggregation, 9 and 4 sectors respectively, in order to make some comparisons with other OECD countries. Besides, we include table 4 with data of Mexican employment at 4 sectors from OECD Labour Force Statistics.

Table 1. Employment and Rates of Employment by sector in Mexico: 17 Sectors
(thousand workers and workers per one thousand inhabitants)

Sector	Employment			Rate of Employment		
	1989	1994	1999	1989	1994	1999
1. Agriculture	6131	6319	6432	76	71	66
2. Energy	197	184	217	2	2	2
3. Mining Metal	319	283	295	4	3	3
4. Mining Non Metal	236	234	219	3	3	2
5. Chemicals	251	211	214	3	2	2
6. Machinery	441	482	714	6	5	7
7. Vehicles	313	339	461	6	5	7
8. Food	630	668	703	8	7	7
9. Textile	528	497	703	7	6	7
10. Printing	177	185	184	2	2	2
11. Other	386	428	503	5	5	5
12. Building	2179	3054	3828	27	34	39
13. Commercial Services	4267	5306	5890	53	59	60
14. Transport Services	1338	1579	1857	17	18	19
15. Financial Services	888	1140	1256	11	13	13
16+17.Social Services	6484	7257	7930	81	81	81
TOTAL	24764	28166	31407	308	315	322

Note: Employment in thousand workers, Rates in number of Workers per one thousand inhabitants. Source: INEGI for Employment and own elaboration for Rates.

In table 1 the classification of sectors corresponds to Eurostat RR17, with Social Services including Public Administration as well as Education, Health and other social services, both private and public, as to say Eurostat groups 16 and 17.

In table 2 we present the classification of production sectors according to Eurostat RR9, with sector Q=3+4+5, K=6+7, C=8+9+10+11, L+G: 13+15+16+17, being Q “Industrial production of Intermediate goods: Mineral and Chemistry”, K “Industrial production of

Capital goods: machinery and transport equipment”. C is “Industrial production of Consumption goods: food, textiles, furniture and other”, L means “Market services”, G is “Public services and other non-market services”, A is “Agriculture, Fishing and Forestry” and E is “Energy”.

Table 2. Employment and Rates of Employment by sector in Mexico: 9 sectors (thousands of workers and number of workers per one thousand inhabitants)

Sector	Employment			Rate of Employment		
	1989	1994	1999	1989	1994	1999
A.- Agriculture	6131	6319	6432	76	71	66
E: Energy	197	184	217	2	2	2
Q: Intermediate Goods	805	727	729	10	8	7
K: Equipment Goods	755	821	1175	9	9	12
C: Consumption Goods	1720	1779	2094	21	20	21
B: Building	2179	3054	3828	27	34	39
Z: Transport Services	1338	1579	1857	17	18	19
L+G: Other Services	11639	13703	15076	145	153	155
TOTAL	24764	28166	31407	308	315	322

Note: Employment in thousands of workers, Rates in number of Workers per one thousand inhabitants. Source: INEGI for Employment and own elaboration for Rates.

Table 3. Employment and Rates of Employment by sector in Mexico: 4 sectors Inegi (thousand workers and number of workers per each thousand inhabitants)

	Employment			Rate of Employment		
	1989	1994	1999	1989	1994	1999
Agriculture	6131	6319	6432	76	71	66
Industry	3477	3511	4214	43	39	43
Construction	2179	3054	3828	27	34	39
Services	12976	15282	16932	162	171	174
Non Agrarian	18633	21847	24975	232	244	256
Total	24764	28166	31407	308	315	322

Table 4: Employment and Rates of Employment by sector in Mexico: 4 sectors OECD (thousand workers and number of workers per each thousand inhabitants)

	Employment			Rate of Employment		
	1991	1994	1999	1991	1994	1999
Agriculture	7532	8361	7590	90	95	78
Industry	5008	5359	7481	60	61	77
Building	1809	1828	2104	22	21	22
Services	14877	16891	20507	177	191	211
Non Agrarian	21694	24078	30092	258	272	310
Total	29226	32439	37682	348	367	388

There has been an important increase in industrial employment in Mexico, from 5 million in 1991 to nearly 7.5 in 1999, a moderate increase in Building, from 1.8 to 2.1, and an important increase in services in which employment evolved from 14.9 million in 1991 to 16.9 in 1994 and 20.5 in 1999.

Total employment has experienced an important increase in Mexico during the period 1999 from 29.2 to 37.7 million and the rate of employment per each thousand inhabitants has increased from 348 to 388.

There are important differences between the data of tables 3 and 4, because INEGI data only includes paid workers while OECD also includes other types of workers such as “unpaid family workers”.

According to INEGI criteria total employment has experienced a similar increase during both periods: 3.4 million employments in the period 1989-94, and 3.2 million in the period 1994-99.

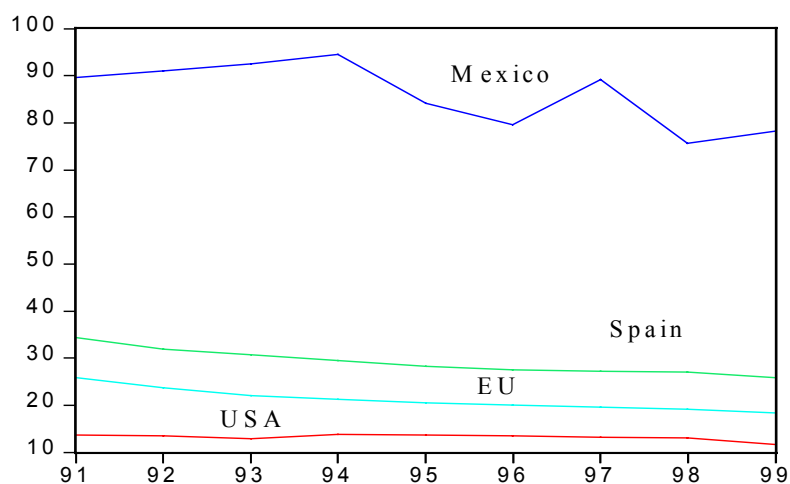
According to OECD criteria total employment has experienced an increase of 3.2 million employments in 1991-94 and 5.2 million in 1994-99. That amounts an annual average of 1.06 million employment for the first period and 1.04 million employment for the second one.

It is important to remark that the increasing evolution of productivity of labour in many sectors would have implied a lower level of employment during the second period in case of stagnation in industrial development, and thus the improvement on industrial development, favoured by integration into NAFTA, has had a positive impact on employment.

The rate of agrarian employment in Mexico has decreased during the period 1991-99, although it is yet very high in comparison with more industrialized countries, while the rate of non-agrarian employment has experienced an important increase from 258 in 1991 to 310 in 1999. Usually, industrialization implies opportunities of finding more jobs in non agrarian sectors with better income per worker.

Graphs 11 and 12 present the evolution of the rates of Agrarian and non Agrarian employment corresponding to the countries of table 5.

Graph 11. Rates of Agrarian employment in Mexico, the USA, EU and Spain
(number of employments per one thousand inhabitants)



The rate of agrarian employment is very high in Mexico, and countries with similar levels of industrial development, and it is expected that this variable will diminish in the future influenced by the new opportunities of jobs in non-agrarian sectors and by the evolution of relative prices of agrarian products in international markets, as it is shown in the econometric model by Guisan and Exposito(2002) for OECD countries, and other studies.

A negative consequence of movements from agrarian to non-agrarian jobs could be emigration from some regions with low rates of non-agrarian employment to those with the highest levels, but this problem can be avoided with adequate economic policies of regional development and rural development.

Graph 12 shows that the rate of non-agrarian employment per one thousand inhabitants in Mexico has experienced an important increase during the period 1991-99, and it is similar to that of Spain, although substantially below the rates of the USA and the European Union.

Graph 12. Rates of Non Agrarian employment in Mexico, USA, EU and Spain

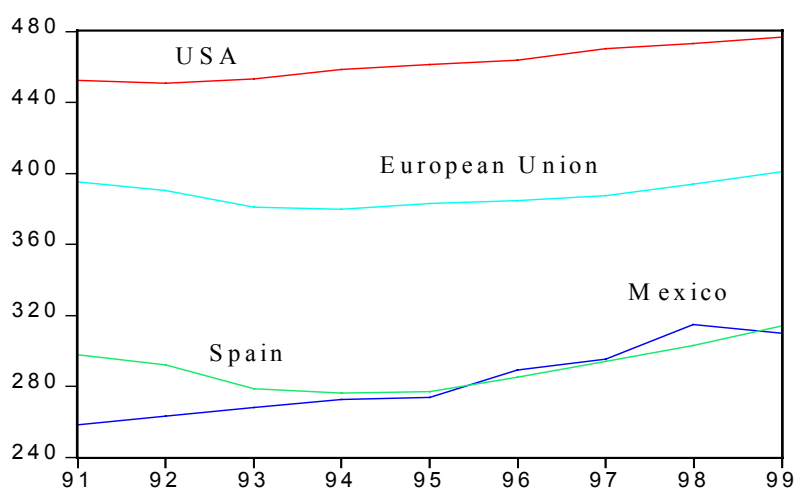


Table 5 presents an international comparison of employment in Mexico with the USA, Spain and the European Union.

Table 5: Rates of Agrarian and non Agrarian Employment in México, USA, Spain and European Union (number of worker per each thousand inhabitants)

Year	Rate Agrarian Employment				Rate Non Agrarian Employment			
	MX	USA	Spain	EU	MX	USA	Spain	EU
1991	90	14	34	26	258	452	297	395
1992	91	13	32	24	263	451	292	390
1993	92	13	31	22	268	453	278	381
1994	95	14	29	21	272	458	276	379
1995	84	14	28	20	274	461	277	383
1996	79	13	27	20	289	464	285	384
1997	89	13	27	20	295	470	294	387
1998	76	13	27	19	314	473	303	394
1999	78	12	26	18	310	476	314	400

Source: own elaboration from OECD Labour Force Statistics.

The rates of non-agrarian employment of Mexico has increased during the last years of the 20th century and has reached a level similar to Spain, although very far from European Union Average and the USA.

We can notice that Mexico has reached a rate of non-agrarian employment similar to Spain in 1999, but both countries have a level lower than European Union average and the USA.

Table 6 presents, with comparison purposes, the rates of employment by sector of Spain in Agriculture, Industry, Building, Services, Non-agrarian, NA, and Total, as well as the total number of workers in non-agrarian activities, LNAE.

Table 6. Rates of Employment by sector in Spain: 4 sectors and LNAE
(number of workers per each thousand inhabitants and LNAE in thousands)

obs	Agriculture	Industry	Building	Services	NA	Total	LNAE
1965	132	97	29	118	244	376	7735
1970	109	99	32	122	253	362	8535
1975	77	96	35	142	273	350	9704
1980	59	83	28	138	249	309	9330
1985	51	67	20	138	225	276	8678
1990	38	77	31	178	286	324	11107
1995	28	63	29	187	279	307	10936
2000	25	73	40	228	341	367	13485

Source: elaboration from OECD Labour Force Statistics.

In Guisan and Aguayo(2001) and other studies we can see that industrial development has been very important in Spain to maintain the level of employment in industry and to increase employment in services and building, through the positive impact of industrial value-added on the evolution of value-added and employment of other non agrarian sectors, through an econometric analysis of relations among these variables.

Here, we present an econometric model for non agrarian employment in Mexico during the period 1991-99, and in Guisan(2003) there is a more detailed econometric analysis of employment by sector.

Econometric model of non-agrarian employment in Mexico

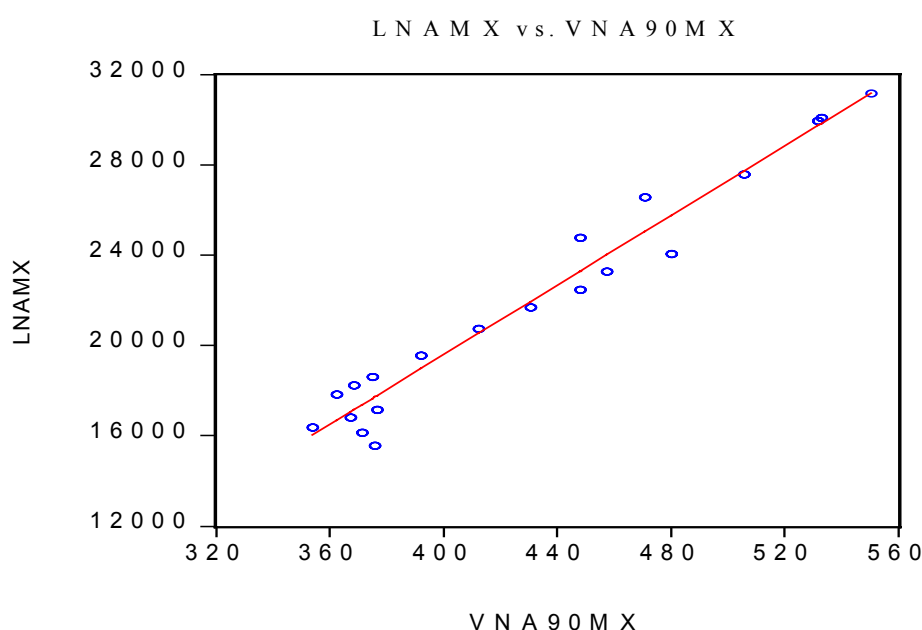
Equation 1 and graph 13 show the important positive relation that exists between non-agrarian employment and the real Value-Added of non-agrarian sectors, in 1981-2000, while equation 2 and graph 14 show the positive relation between other non agrarian sectors and industrial development, and equation 3 presents a relation for industrial value-added.

The dependent variable of equation 1, LNAMX, is non agrarian employment, in thousand persons, and the explanatory variables are the lagged value of the dependent variable and the increase of Real Value-added of non-agrarian sectors, VNA90MXPP. Value-added is expressed in billion dollars at 1990 prices and purchasing power parities, according to the production approach.

Equation 1. Non Agrarian Employment and real Value-Added of Mexico

Dependent Variable: LNAMEX				
Method: Least Squares				
Sample(adjusted): 1981 2000				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNAMEX(-1)	1.032453	0.005304	194.6588	0.0000
D(VNA90MXPP)	14.02406	6.337332	2.212928	0.0401
R-squared	0.993150	Mean dependent var	21938.33	
Adjusted R-squared	0.992770	S.D. dependent var	5061.935	
S.E. of regression	430.4227	Akaike info criterion	15.06205	
Sum squared resid	3334746.	Schwarz criterion	15.16163	
Log likelihood	-148.6205	Durbin-Watson stat	2.746032	

Graph 13. Non-agrarian employment and Value-Added: Mexico 1981-2000

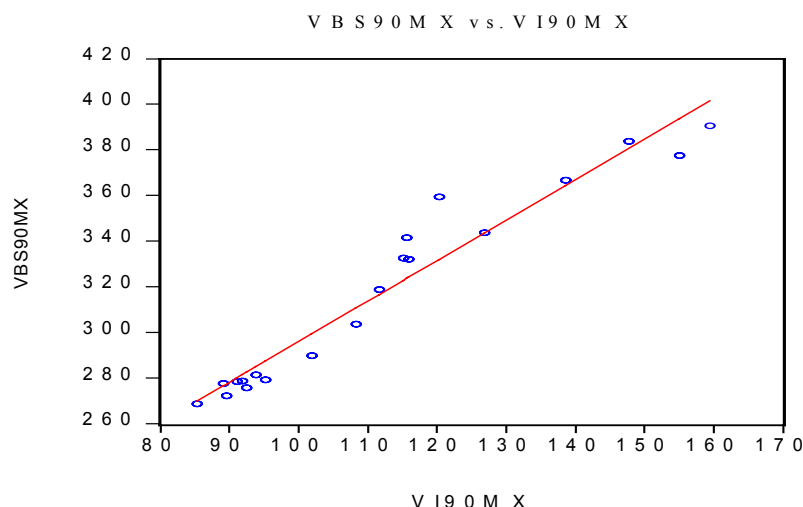


The dependent variable of equation 2, VBS90MX, is the real Valued-Added of Building and Services, which is explained as a function of its lagged value and the increase in real Value-Added of Industry.

Equation 2. Value-Added of Building and Services in Mexico 1981-2000

Dependent Variable: VBS90MXPP				
Method: Least Squares				
Sample: 1981 2000				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VBS90MXPP(-1)	0.997813	0.007783	128.2003	0.0000
D(VI90MXPP)	1.921702	0.399542	4.809758	0.0001
R-squared	0.961461	Mean dependent var	317.9605	
Adjusted R-squared	0.959320	S.D. dependent var	42.14356	
S.E. of regression	8.500099	Akaike info criterion	7.212672	
Sum squared resid	1300.530	Schwarz criterion	7.312245	
Log likelihood	-70.12672	Durbin-Watson stat	1.611243	

Graph14. Value-added of Building and Services related with Industry in Mexico 1981-2000



Finally equation 3 presents a relation of Industrial Value-Added with foreign trade and other variables, from the demand side. Variables are from OECD statistics and expressed in billion dollars at 1990 prices and exchange rates.

The explanatory variables of this equation are the lagged value of the dependent variable VI90MX and the first differences of Imports of goods and services, IMP90MX, Exports of goods and services, EXP90MX, Consumption private and public, CT90M, and Fixed Capital Formation, I90MX.

Equation 4. Demand side equation for Value-Added of Industry in Mexico

Dependent Variable: VI90MX				
Method: Least Squares				
Sample(adjusted): 1961 1995				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VI90MX(-1)	1.004600	0.007027	142.9633	0.0000
D(IMP90MX)	-0.086397	0.037264	-2.318518	0.0274
D(EXP90MX)	0.145134	0.045181	3.212290	0.0031
D(CT90MX)	0.173229	0.048589	3.565205	0.0012
D(I90MX)	0.233845	0.081613	2.865290	0.0075
R-squared	0.998809	Mean dependent var		38.53370
Adjusted R-squared	0.998650	S.D. dependent var		16.82994
S.E. of regression	0.618259	Akaike info criterion		2.007746
Sum squared resid	11.46734	Schwarz criterion		2.229939
Log likelihood	-30.13556	Durbin-Watson stat		1.872644

These equations show very clearly that there has been a positive impact of foreign trade on industrial development and non-agrarian value-added and employment in Mexico during the last decades of the 20th century.

Equation 3 shows that an increase of one unit both in Exports and Imports does not have a null balance on the real Value-Added of Industry, but a positive one, because the increase in Exports induces a positive change higher than the diminution induced by the increase in Imports. In this regard it is important to consider that imports are not always

substitutive of internal production but very often they have important complementary relations.

Besides that the positive effect of the increase of foreign trade could have positive influence on other variables and favour employment in building and services, as it can be seen in the more detailed model by Guisan(2003)

6.- Conclusions and economic policy suggestions

We agree with Goldin and Kaft(2001) in that the USA economic leadership in the world has been due historically and nowadays to its high level of expenditure on education per inhabitant. The main step to get economic development is education, and unfortunately this advice was not followed by many governments and international organizations which seemed more preoccupied by external trade, foreign aid and other relatively secondary questions.

Usually richest countries do not have higher rates of growth of production than poorest ones, but richest countries have very high educational levels of population and low rates of population growth while poorest countries have low levels of expenditure on education and excessive rates of population growth.

The best way to get the reduction of excessive fertility rates, and to increase the level of real Gdp per inhabitant, is to increase the level of education of population. As seen in Guisan, Aguayo and Exposito(2001) an increase of 2 years on average schooling of adult population implies a reduction of one child in the averages rates of fertility by woman, and this has a positive impact on the growth rate of Gdp per inhabitant.

Many opportunities and challenges for Mexico in this regard still are to be developed in order to increase expenditure on education, the real value-added per inhabitant in manufacturing and the real income per inhabitant. Improving education is more important than improving trade, and because of that, more emphasis should be given to this essential question in economic policies.

Given the high rates of agrarian employment that Mexico has and the evolution of real income from Agriculture, which is not easy to solve with production increases because that usually lead to lower relative prices of agrarian products, it is of uppermost importance to give priority to rural and regional development in Mexico, with the development of industry, tourism and other services in many regions and rural areas, in order to avoid emigration from those territories and congestion of the most populated areas.

Eradicating poverty and increasing the levels of social services are two main aims that should receive priority in economic policies but in this regard it is important to insist upon the main question that it is the low level of industrial value-added per inhabitant. So measures to improve industrial development, together with the necessary increase in foreign trade, are important priorities because the development of services and the increase in average income per inhabitant depends heavily on industrial development. Tourism can be useful, generally as a complement, and in some small areas it can be indeed a main source of development.

The econometric model of section 5 shows the important impact that industrial development has in the increase of real Value-Added of building and services, and the positive consequences of industrial development on the rates of non-agrarian employment.

Now, that the fertility rates have fortunately decreased in Mexico and population growth is more similar to world average, as seen in graph 5, it is a good moment to design efficient economic policies to foster industrial development, educational level of population and efficient organization of public institutions. Physical capital, human capital, social capital and the interactions among these three sources of development will lead to improve socio-economic conditions in Mexico and to reach higher levels of development during the first decades of the 21st century.

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¹ These articles and working papers are available on-line at <http://ideas.repec.org>

² Information on these publications at: <http://www.usc.es/economet/eea.htm>